

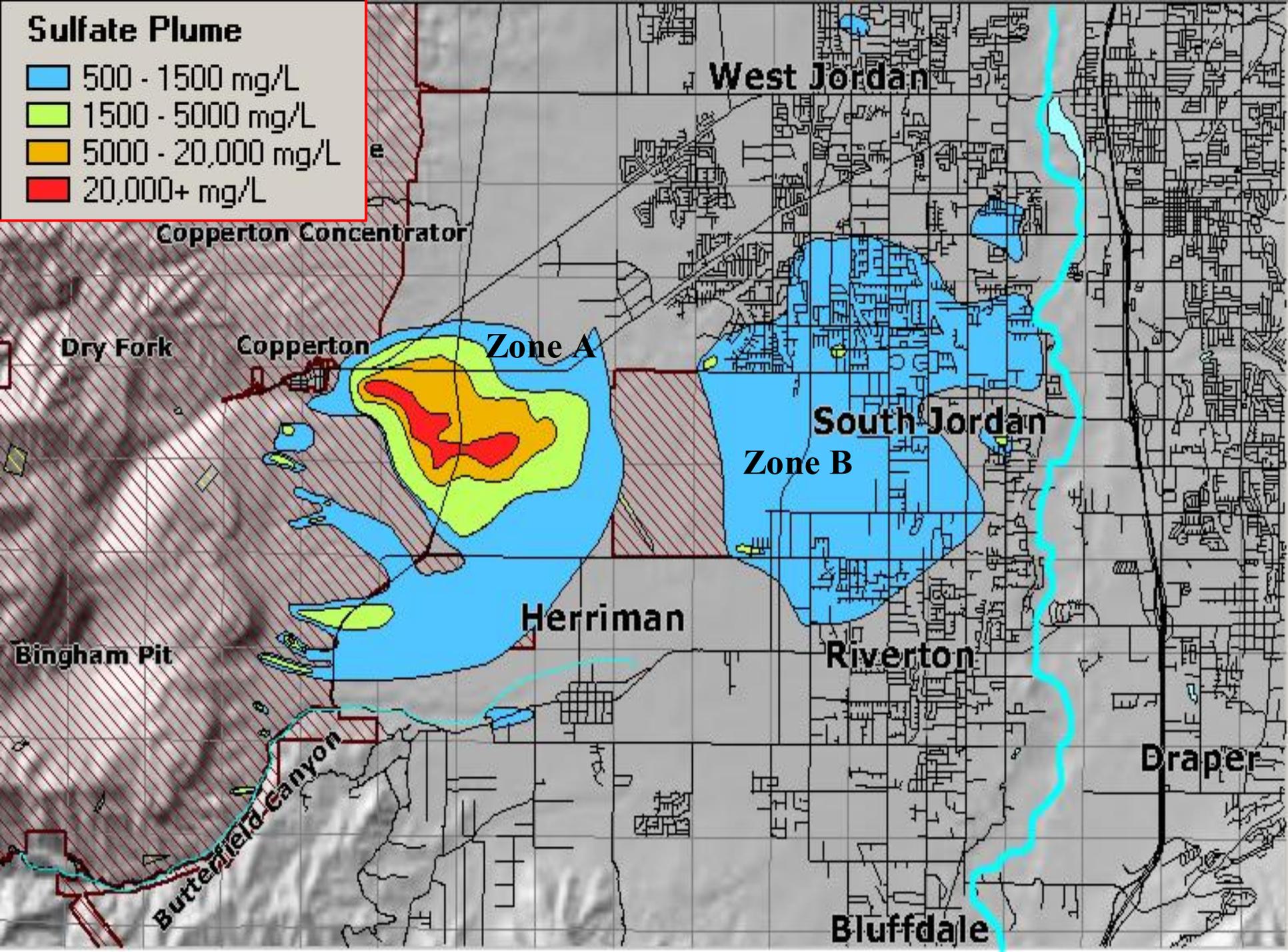
Great Salt Lake Water Quality Initiative

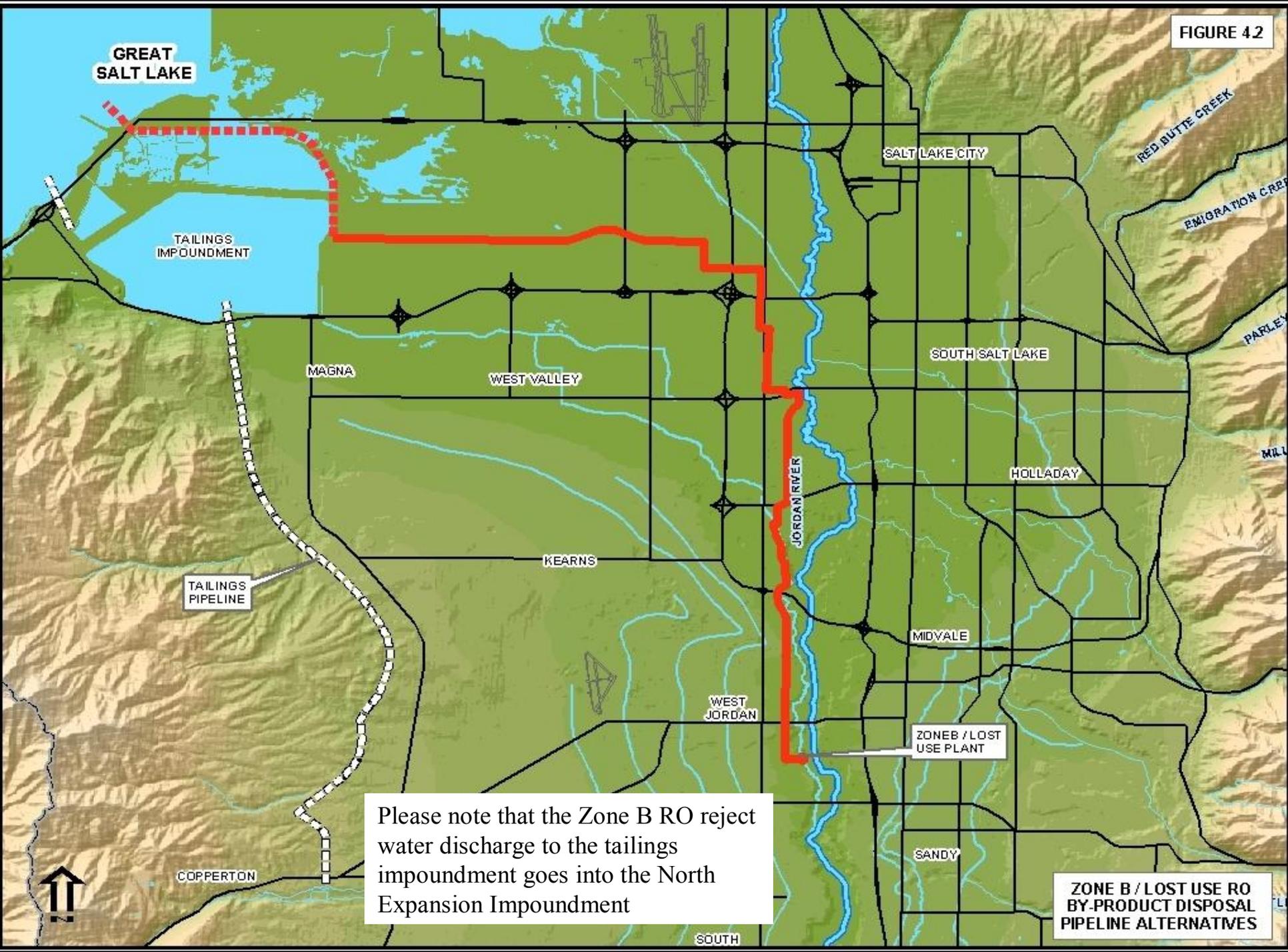


Developing a Selenium Standard for the
Open Waters of the Great Salt Lake
Utah Division of Water Quality
Salt Lake City, Utah

Sulfate Plume

- 500 - 1500 mg/L
- 1500 - 5000 mg/L
- 5000 - 20,000 mg/L
- 20,000+ mg/L





Please note that the Zone B RO reject water discharge to the tailings impoundment goes into the North Expansion Impoundment

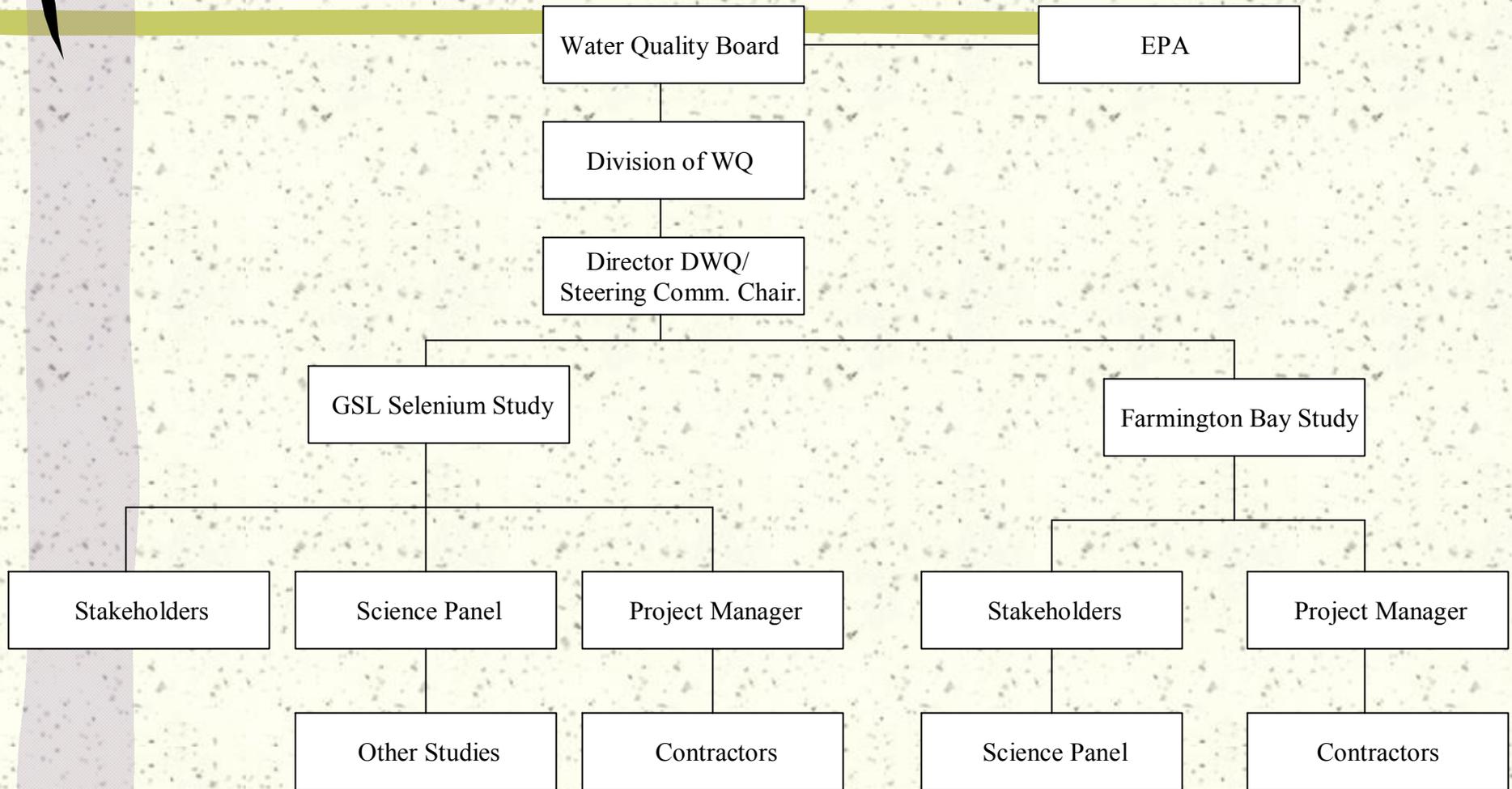
ZONE B / LOST USE RO BY-PRODUCT DISPOSAL PIPELINE ALTERNATIVES



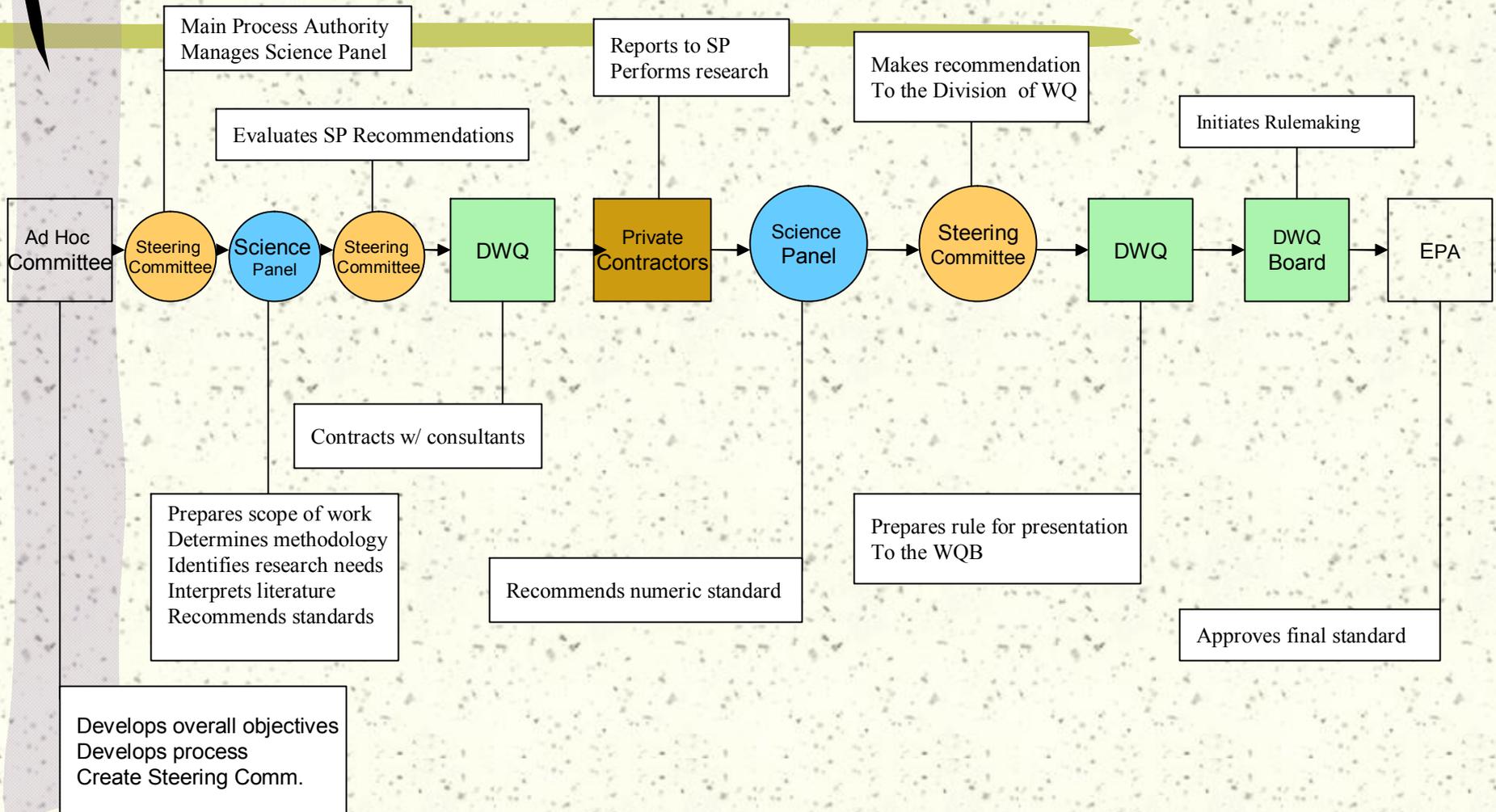
Response to Selenium Concern

- # In response to the selenium concern, DWQ recognized the need to develop numerical standards to protect the beneficial uses of the GSL.
- # The proposing parties (mid-2004) recognized the need to involve interested parties to address the questions about selenium fate and transport.
- # Establish the Great Salt Lake Water Quality Steering Committee to study the water quality of the Lake and make recommendations to the Division of Water Quality regarding a numeric water quality standard for Selenium for the open waters of the Lake.

Organizational Chart



Standard Setting Process



Steering Committee Purpose

- # Create a partnership among stakeholders
- # Conduct a transparent public process
- # Establish a Science Panel
- # Sponsor and guide scientific research
- # Help secure funding
- # Adhere to state & federal laws & regulations
- # Make recommendations to the Division of WQ

Steering Committee Make-up

1. Forestry & State Lands
2. Wildlife Resources
3. EPA Region VIII
4. US Fish & Wildlife
5. Brine Shrimp Industry
6. Mineral Extractors
7. US Geological Survey
8. Kennecott Utah Copper
9. Jordan Valley WCD
10. POTWs
11. GSL Alliance
12. GSL Alliance
13. Duck Clubs
14. Wasatch Front RC
15. DEQ
16. DWQ

Decision-making Process

- # A quorum is defined as 3/4 of the Steering Committee
- # Consensus (unanimity) is sought in all decisions
- # For procedural actions a supermajority (3/4) is needed
- # If consensus cannot be reached on substantive matters, all positions will be forwarded

Miscellaneous

- # The goal is to have the Steering Committee make a recommendation for a Selenium standard to DWQ by August 2007
- # Local, state and federal funds are pledged to this effort
- # The Steering Committee may be maintained to develop other standards for the GSL

Science Panel

- # William Adams, Ph.D.,
Rio Tinto
- # Anne Fairbrother, Ph.D.,
EPA
- # Don Hayes, Ph.D.,
University of Utah
- # Theron Miller, Ph.D.,
DWQ
- # William Moellmer, Ph.D.
Division of Water Quality
- # Brad Marden,
Utah Artemia Assoc.
- # Terresa Presser, Ph.D.
US Geological Survey
- # Joseph Skorupa, Ph.D.
US Fish & Wildlife
- # William Wuerthele,
EPA

Presentations from Steering Committee Members

Richard Bay, JVWCD

- Duties and charges to Science Panel
- Need to identify gaps and scope of work
- Requested need to move forward quickly.

Mansuel Pearce

- Need for good science in an efficient and planned way.

Presentations from Steering Committee Members (cont'd)

Leland Myers

- Need to include impairment of the beneficial uses as a part of the study.
- "Time doesn't drive science but science can drive time."

Laboratory "Round Robin"

Reason for Round Robin

- Identify best analytical technique
- Resolve variability of data currently available.
- Determine ability of laboratories

Splitting Samples

- Environmental Resource Associates, Arvada, Colorado

Pulling the Samples

Depth

- 1 meter
- 7 meters

GSL Sampling Protocol

- Needs to be compiled and re-written
 - Lynn Hutchinsen, Kennecott
 - Dave Naftz, USGS
- We will filter in the field
- Do not acidify in the field [ERM]
 - 4 ml Ultra Pure Nitric Acid per Liter

Round Robin Statistical Design

- # **Two Sample Locations**
 - 1 Meter and 7 meters
- # **Triplicate Samples from each location**
- # **Four Spike levels for each location**
 - 0.1 – 1.0; 1.0 – 5.0; 10-50; 50-100 ug/l Se
- # **Triplicates for each spike level**
- # **Spiking Levels Created by Random Generator**

Location #1 = Gilbert Bay - 1 meter depth							
Laboratory:	Laboratory Name			Method:	Describe		
Sample ID	Spike Level	Spike Value ug/L	Sample Number	Reported Value, ug/L	Cost	Sample Size, ml	
Sample #1	GSL	0.00	6		\$ -	250	
Sample #2	GSL	0.00	54		\$ -	250	
Sample #3	GSL	0.00	12		\$ -	250	
Spike #1a	0.1-1.0	0.64	64		\$ -	250	
Spike #1b	1-5	4.00	21		\$ -	250	
Spike #1c	10-20	11.00	25		\$ -	250	
Spike #1d	50-100	62.00	47		\$ -	250	
Spike #2a	0.1-1.0	0.64	18		\$ -	250	
Spike #2b	1-5	4.00	19		\$ -	250	
Spike #2c	10-20	11.00	12		\$ -	250	
Spike #2d	50-100	62.00	99		\$ -	250	
Spike #3a	0.1-1	0.64	64		\$ -	250	
Spike #3b	1-5	4.00	31		\$ -	250	
Spike #3c	10-20	11.00	10		\$ -	250	
Spike #3d	50-100	62.00	38		\$ -	250	
Total					-	3.75 liter	

Paper Presentation: William Adams, Ph.D.

- # "Derivation of a Chronic Site-specific Water Quality Standard for Selenium in the Great Salt Lake, Utah"
 - Conc. of Selenium in Kennecott outfall and Brine Shrimp decreases as a function of distance from the Kennecott outfall.
 - Evaluate the concentration of selenium in the brine shrimp (food source) where impairment to bird embryo begins.
 - Where does the concentration of the outfall equal that value and set that value as the chronic standard.

Presentation by EPA

William Wuerthele

- # Specific criteria will be derived by adjusting national criteria by including a data set on indigenous species (Brine shrimp and brine flies)
- # Key issue: Tissue value will need to be translated to a water column value.
- # Discussion: Whole body or reproductive organs.

Assignments to Science Panel Members

- # Skorupa: Data on brine fly and brine shrimp in California evaporation ponds.
- # Adams: Data on some of the species collected in the Great Salt Lake
- # Marden: Put together a "workshop" of experts to discuss on the life cycle and biology of the target species of *Artemia* and *Ephydra*.
 - Avian diet, behavior seasonal occurrences.

Assignments, cont'd

- # Moellmer: Finalize participating labs and ERA for commitment to participate and costs.
 - Letters & Contract
- # USGS and Kennecott are putting together the protocol for sampling waters from the Great Salt Lake.
- # Fairbrother: Will further discussion of toxic reference values.
- # Skorupa: Will discuss uncertainty in various approaches to toxic reference values.

For the Next Meeting

- # Two day meeting: March 16-17, 2005
[Meeting will probably be changed to March 15-16, 2005)
- # Presentations by panel members
 - Fairbrother, Skorupa, & Adams
- # GSL Biology 101
 - Don Paul
 - Gary Belovsky (Notre Dame)
 - Wayne Wurtsbaugh, et.al.

For the Next Meeting, cont'd

- # Approve sampling protocols
- # Approve initiation of round robin
- # Discussions:
 - What are we trying to protect
 - Do we now understand the dynamics of the biology and chemistry of the lake.
 - Define the boundaries of the lake.
 - High Water Line
 - Wetted Perimeter

Project Expenditures

EPA \$15,000 Grant

- Laptop Computer: \$1650

- Carboys Sampling Flasks: \$350

Science Panel \$25,000

- Travel: \$492.94

- Sundries: \$17.48